



Figure 10. Geographic distributions of *Penaincisalia* species in Andean regions of South America (see distribution remarks under generic entry and remarks under *P. culminicola*).

153, fig. g; Comstock & Huntington 1958–1964 [1959]: 65; Lamas 1977: 71 (as “*Thecla*”); Bridges 1988: II.109. NEW SYNONYMY.

[*Incisalia*] *alatus*: Brown 1942: 1 (included categorically taxa of Draudt’s *culminicola*-group in *Incisalia*); Gillham 1956: 145 (regarded *Incisalia* as Holarctic).

caudad of the cervix bursae; cervix bursae hood ovate (height about two-fifths ductal length), sculptured with raised ridges proxad of the midline; each signum elongate basally, with a wide, inwardly directed, spine.

Diagnosis. —Upper surface of wings on both sexes brilliant orange (iridescent in males, flat in females) except for fuscous margins and apices. Lower surface with mottled and hoary patterns much like *P. culminicola* but with suffusions distinctly overcast with yellow and orange and forewing discal area brightly orange.

Distribution. —*Spatial* (Fig. 10): high montane localities in the Cordillera Blanca of Peru. *Temporal*: late November to early August; one specimen is marked “dry season”.

Remarks. —Subsequent to the 1985 return of BM(NH) historical material, a dermestid infestation resulted in destruction of much of that material listed above (P. Ackery, J. Huxley, personal communications). Campbell Smith (BM[NH]) has since repaired a number of specimens from remaining parts. Fortunately, the species has been subsequently collected.

Genitalia of all known specimens were dissected and AMNH specimens were dissected for legs and palpi also.

Etymology. —The Latin name means orange or gold colored.

Penaincisalia caudata Johnson, NEW SPECIES

Figs. 2E, 5A

Types. —*Holotype*, male (Figs. 2E, 5A) deposited BM(NH), data: PERU. Cajamarca, 2800 m, Simons Collection. *Paratypes*. PERU. Cajamarca, 3800 m, O. Baron, ex Hamilton Druce Collection, 1 male (in poor condition, tails broken off) (BM[NH]).

Description. —*Male*. Head, thorax, abdomen, palpi and forewing androconial brands typical of genus. Wings: upper surface ground color dull iridescent lilac blue, somewhat orange suffused along hindwing anal margin, both wings with wide fuscous margins; lower surface ground color tan, heavily suffused brown, black basad of forewing postmedian line and hindwing medial band; forewing with checkered fringe, dark marginal border basally, dark submarginal blotches along veins, spot nearest apex along radial veins prominent and larger than others, postmedial band prominent, pronounced spot paralleling submarginal radius, prominent distal black spot at discal cell; hindwing accented by darkly suffused basal disc contiguous with dark suffusion of forewing, medial band wavy, basally black, distally white to tan, black chevrons submarginally or blotches over light tan ground, margin darkly suffused, short tail at vein CuA2 terminally. Forewing length: 10.5 mm (holotype). Genitalia (Fig. 5A): valvae ventrally produced, filling entire vincular area, bilobed areas constricted basally near indentation, caudal extension thickly tapered to blunt termini; saccus diminutive, lobate with rounded margin, robust where adjoining vinculum; aedeagus robust, length one-half to three-fifths longer than rest of genitalia, caecum about two-fifths aedeagal length, displaced laterally from plane of aedeagal shaft in dorsal or ventral view. *Female*. Unknown.

Diagnosis. —Differs from all *Penaincisalia* by having a short tail at terminus of the CuA2 vein of the hindwing (see *Remarks*). If the tails are broken, *P. caudata* can be distinguished by the upper surfaces of wings in males, which are iridescent lilac blue but with much wider fuscous borders than *P. culminicola* and *P. aurulenta*. The lower wing surfaces are most like these species but differ with a dark suffusion over a tan ground color, and a much darker area basad of the forewing postmedial line and the hindwing medial band.

Distribution. —*Spatial* (Fig. 10): known only from type locality. *Temporal*: unknown.

band from costa to cell CuA1 (basally suffused dark brown, distally cream); hindwing with dark brown basal disc, irregularly edged and extending distally to the postmedial area, submarginal ground color beige, margin with small brown dots in each cell. Forewing length: 11.0 mm (holotype). Genitalia (Fig. 6E): valvae ventrum extremely narrow with bilobed area steeply inclined and caudal extension abruptly and thinly tapered; vinculum ventrally distended with small, rectangular, saccus; aedeagus about two-fifths longer than rest of genitalia, shaft length exceeding caecum length by about one-fourth. *Female*. Unknown.

Diagnosis.—Upper surface iridescence and under surface basal disc unique among *Penaincisalia*: former occurring as bright lavender on entire forewing and cephalad of discal cell on hindwing, latter concolorous brown extending distally to the hindwing postmedial area. Male genitalia with ventrally distended vinculum and narrow valvae steeply inclined basally, with thin termini.

Distribution.—*Spatial* (Fig. 10): known only from type locality. *Temporal*: known only from November type data.

Remarks.—The type locality is some 2000 km disjunct from other *Penaincisalia*, possibly due to paucity of high montane sampling from Argentina southward. Endemism at type locality is suggested by fact that among Theclinae, except for *Strymon eurytulus*, sample was comprised wholly of undescribed taxa (see Johnson et al. in press).

Etymology.—The Latin name adds *vaga* (roamer) to Patagonia.

The *Penai*-group

Hindwing anal lobes pronounced, fringes concolorous red brown; upper surface structural colors violet red to maroon, hindwing with rufous limbal patch in titular species; lower surface ground color generally mottled red brown with lineal pattern elements. Genitalia more robust than in *culminicola*-group, particularly in male valvae and vinculum and female ductus bursae.

Penaincisalia penai Johnson, NEW SPECIES

Figs. 7A, 7B, 8A, 8B

Thecla culminicola [not Staudinger 1894]: 80, pl. 2, fig. 6. Weeks 1905: 28. Draudt 1919: 760, pl. 153, fig. g; Comstock & Huntington 1958–1964 [1959]: 198; Lamas 1977: 71 (as “*Thecla*”); Bridges 1988: II.109.

[*Incisalia*] *culminicola* [not Staudinger 1894]: Brown 1942: 1 (included categorically taxa of Draudt’s *culminicola*-group in *Incisalia*); Gillham 1956: 145 (regarded *Incisalia* as Holarctic).

[*Penaincisalia*] *culminicola* [not Staudinger 1894]: Bridges 1988: I.95 (nonbinomial combination in index, genus as *nomen nudum*).

Types.—*Holotype*, male; *allotype*, female (Figs. 7A, 7B, 8A, 8B) deposited AMNH, data: ECUADOR. Cuicocha, Imbabura, 3100–3500 m, 29 Apr 1939 to 31 May 1939, F. Brown. *Paratypes*. ECUADOR. Cuicocha, Imbabura, 3100–3500 m, 29 Apr 1939 to 31 May 1939, F. Brown, 12 males, 1 female (AMNH); Hda. Talahua, Bolivar, 3100 m, 4 May 1939, F. Brown, 1 male, 1 female (AMNH); Paramo Tinpulla, Cotapaxi, 3500 m, 6 Nov 1938, F. Brown, 1 male, 1 female (AMNH); Hda. San Rafael, Rio San Pedro, 2700 m, 5 Nov 1938, F. Brown, 1 male; Paramo Pasochoa, 3300 m, 12 Nov 1938, F. Brown, 1 male, 1 female (AMNH).

Description. — *Male.* Head, thorax, abdomen, palpi and forewing androconial brands typical of genus. Wings: upper surface ground color dark iridescent purple, narrow margin and wide area of forewing apices fuscous, hindwing limbal area bright rufous, fringe red brown; lower surface ground color rich maroon, sometimes lighter, suffused brown and red; forewing with thin, dark red brown postmedial line, costa to vein CuA2, marginal cells with dark red brown blotches; hindwing basal disc heavily suffused with dark red brown, bordered distally by dark brown medial band edged with white, submarginal ground lighter brown with dark red brown blotches in each cell. Forewing length: 11.0–14.0 mm. Genitalia (Fig. 8A): valvae ventrally robust, bilobed areas widely parabolic, caudal extension thickly tapered (some variation in length and robustness of caudal extension in this widespread species); vinculum laterally more pronounced and saccus more prominent than in most *Penaincisalia*; aedeagus robust, length about one-third longer than rest of genitalia, caecum about two-fifths aedeagal length. *Female.* Head, thorax, abdomen and palpi typical of genus. Wings: upper surface ground color dull brown, hindwing with outstanding limbal rufous patch; lower surface similar to males. Forewing length: 10.5–13.5 mm. Genitalia (Fig. 8B): ductus bursae robust, caudal end longer and more fluted than cephalic end, center constricted and only lightly sclerotized; terminal lamellae short, robust; cervix bursae hood small, trapezoidal (height equalling about one-third length of ductus bursae), hood surface sculptured with two prominent ridges proxad of midline and dorsad of ductus seminalis; each signum short, robust, with an inwardly directed spine.

Diagnosis. — Differs from all other *Penaincisalia* by a rufous limbal patch on the hindwing upper surface; upper surface ground otherwise dark iridescent purple in males, brown in females. Compared to other group members, hindwing anal lobe is less prominent and lower surface basal disc has more irregular distal margin.

Distribution. — *Spatial* (Fig. 10): known from high montane localities in Colombia, Ecuador, Peru and Bolivia. *Temporal*: specimen dates range from October to late May.

Remarks. — As noted, examination of the types of *Thecla culminicola* indicates they are not the familiar purple species historically associated with the name. Confusion probably originated because most workers have identified “culminicola” from areas other than Bolivia. Weeks (1905) misused the name, reporting specimens from Coroica and Cachabamba. The Cachabamba specimens of Germain at the British Museum of Natural History include both true *P. culminicola* and *P. penai* but Weeks may have thought they were “culminicola” and “alatus”. Draudt figured both “alatus” and “culminicola”, saw the type of the latter, and referred to the upper surface of “culminicola” as “deep violet” (Draudt 1919: 760). He cited wing fringe differences (which appear highly variable, particularly with wear) as the most notable distinction among specimens he had viewed. Draudt reported “culminicola” from Colombia (3500–4400 m) and Cuzco, Peru (3–4000 m), the latter a common locality for “true” *culminicola*. Brown (1942) believed that “culminicola” was the common purple species in Ecuador and widely reported it as such. His series from the American Museum of Natural History is designated here as types of *P. penai*. *P. penai* varies little, except for differences in ground color hues and the robustness of the genitalia.

Along with the type, 39 specimens of *P. penai* were examined; AMNH and BM(NH) specimens were dissected for genitalia, and AMNH specimens from the former were dissected also for legs and palpi.

Etymology. — This familiar species is named for Lucho Peña, an Andean lepidopterist.

Material Examined. — BOLIVIA. Bolivie, 2 males, 1 female (MNHN); Bolivie, 1 male (BM[NH]). ECUADOR. Andes of Ecuador, E. Whymper, 1 male, 1 female (BM[NH]); see *Types* above. PERU. Cuzco, 1 male, 1 female (MNHN); Cordillera Occidental, Andes, N Peru, 2 males (MNHN); Cayuma

Puente, Huanuco, 23 Oct 1946, J. Pallister, 1 male (AMNH); Ccapana Hacienda, Ocongate, Cuzco, 3333 m, 6–12 Apr 1947, J. Pallister, 1 male (AMNH).

Penaincisalia candor (Druce), NEW COMBINATION

Figs. 7C, 7D, 8C, 8D

Thecla candor Druce 1907: 578, pl. 33, fig. 1. Comstock & Huntington 1958–1964 [1959]: 174; Bridges 1988: I.69.

Thecla candar [sic]: Dyar 1913: 636 (misspelling).

Thecla amatista [not *amatista* Dognin 1895]: Druce 1909: 433; Bridges 1988: I.69, II.104 (synonymy in error, see *Remarks*).

Type.—*Holotype*, male, BM(NH) (Fig. 8A). *Type Locality*: PERU. Huanca-bamba, 1818–3030 m.

Description.—*Male*. Head, thorax, abdomen, palpi and androconial brands typical of genus. Wings: upper surface ground color deep violet red, apices and margins fuscous, hindwing anal lobes elongate and suffused rufous; lower surface ground color of both wings divided into darker basal and lighter distal shades by bold postdiscal line (often less prominent on forewing); forewing with submarginal line of dark brown dashes, costa to cell CuA1; hindwing with similar line, costa to anal lobe on hindwing, basal disc mottled and suffused darker brown particularly along distal margin. Forewing length: 13.0–14.5 mm. Genitalia (Fig. 8C): labides, vinculum and saccus rather elliptical, latter very broad for *Penaincisalia*; valvae robust, bilobed area prominently sculptured, caudal extension thickly tapered; aedeagus length two-fifths longer than rest of genitalia, caecum about two-fifths aedeagal length. *Female*. Head, thorax, abdomen and palpi typical of genus. Wings: upper surface similar to males but flat purple with fuscous margins and less angular hindwing; lower surface similar to males. Forewing length: 13.0–14.5 mm. Genitalia (Fig. 8D): ductus bursae emphatically angled (central area greatly constricted between bulbous cephalic end and ellipsoid caudal end), lamellar lobes widely parallel; cervix bursae hood hemispherical (height equalling or slightly exceeding half ductal bursae length), hood complexly sculptured over dorsocaudal surface to point of attachment of ductus seminalis; each signum elongate basally with short, inwardly directed, spine.

Diagnosis.—Compared to all other *Penaincisalia*: hindwing anal lobes markedly elongate, male upper surface darker iridescent violet red. Compared to other group members: both sexes lacking upper surface rufous patch of *P. penai*, females dull iridescent violet (not brown), lower surface of wings with single, elongate, medial band directed straight from inner margin to anal area (not rounded about basal disc as in *P. penai* or with two bands as in *P. bimediana*).

Compared to small taxa of *loxurina*-group with elongate hindwing anal lobes and similar wing pattern (particularly, *Thecla amatista* Dognin [Fig. 7F, 9B, 9C]): males of *loxurina*-group have single androconial brand on each forewing (apex of costal vein of the discal cell), morphology of *loxurina*-group typified by elongate valvae in males and elongate ductus bursae in females with little or no modification of the cervix bursae (Fig. 9B, 9C).

Distribution.—*Spatial* (Fig. 10): known from several high montane localities in Colombia, Ecuador and Peru (see *Remarks*). *Temporal*: specimen dates range from January to July.

Remarks.—Druce (1909) synonymized *T. candor* with *T. amatista* but did not dissect the type and apparently did not examine its forewing androconial brands. Though these species are superficially similar, androconial brands and genitalia indicate the taxa are not congeneric (Figs. 8C, 8D, 9B, 9C). *Thecla amatista* is usually much larger (forewings 14.5–16.0 mm, Figs. 7C, 7D, 7F). There are several undescribed species closely related to *T. amatista* with which *T. candor* can also

be confused. Consequently, *T. candor* may be more widely distributed than previously indicated. The majority of specimens that I examined and identified as *P. candor* prior to this study were either misidentified *T. amatista* or undescribed species closely related to it. Reliable identification of females requires dissection. Female genitalia of *T. amatista* lack the elaborately sclerotized cervix bursae typical of *Penaincisalia* (Fig. 9C). I have identified *T. amatista* from the type (BM[NH], Figs. 7F, 9B) and a series of seven males and one female, collected by F. M. Brown, at Hda. Talahua, Bolivar Prov., Ecuador, 3100 m, 4 May 1939 (where Brown also captured *P. candor*).

In addition to the types of *Thecla candor* and *T. amatista*, all BM(NH) and AMNH specimens of both species (listed above and below) were dissected; the AMNH specimens were also dissected for legs and palpi.

Material Examined.—COLOMBIA. Quasca, 1 male (BM[NH]); Quasca, Cordillera Oriental, 2900–3300 m, 30 Jan 1946, 1 male (AMNH); Cordillera Oriental, 1 male (BM[NH]); El Tabano, Putumayo, 3300 m, 1 Jul 1981, J. Sullivan, 1 female (AMNH) (Fig. 7D). ECUADOR. Cuicocha, Imbabura, 3800 m, 31 May 1939, F. Brown, 1 male (AMNH) (Fig. 7C); West Slope of Andes, E. Whympier, 3 males (BM[NH]); El Monje- pres [= nr] Loja, 1 male (MNHN). PERU. Huancachamba, 1818–3030 m, 2 males (BMNH); Huancabamba [sic], Cerro de Pasco, 1818–3030 m, Bottger, 2 males (BM[NH]); Ccapana Hacienda, Oconogate, Cuzco, 3333 m, 6–12 Apr 1947, J. Pallister, 1 female (AMNH). See *Type* above.

Penaincisalia bimediata Johnson, NEW SPECIES

Figs. 7E, 9A

Types.—*Holotype*, female (Figs. 7E, 9A) deposited AMNH, data: ECUADOR. Cuicocha, Imbabura, 3800 m, 31 May 1939, F. Brown.

Description.—*Male*. Unknown. *Female*. Head, thorax, abdomen and palpi typical of genus. Wings: upper surface ground dark brown, fringes light brown; hindwing with elongate anal lobe slightly suffused rufous at the base [lobe broken on wing surface illustrated in Fig. 7E]; lower surface ground color tawny, suffused red brown; forewing with dark slash in discal cell and two parallel bands, postmedial and submarginal, from costa through cell CuA2; hindwing basal disc darker red brown, distal margin forming rather straight, darkened medial line paralleled in submargin by line of fused red brown dots. Forewing length: 10.5 mm (holotype). Genitalia (Fig. 9A): ductus bursae robust, central area less constricted than in other *Penaincisalia*, caudal end moderately fluted, terminating in short, lobelike, lamellae; cervix bursae hood ovate (height equalling about one-half ductus bursae length), sculptured with prominent central ridge and radiating proximal folds; corpus bursae with two, steeply pronged, signa.

Diagnosis.—Differs from all other *Penaincisalia* by brown upper surface of wings and elongate hindwing lobes and, on the lower surface, prominence of two stripes, postmedial and submarginal on forewing, medial and submarginal on hindwing (see *Remarks*).

Distribution.—*Spatial* (Fig. 10): known only from type locality. *Temporal*: known only from type data.

Remarks.—In a series of 11 specimens of *P. penai* collected by F. M. Brown on the same day, this female was much darker brown, had a prominent anal lobe, and lacked the limbal rufous patch. Dissection further showed it to be distinct from sympatric and synchronic *P. penai* females. Brown also collected an undescribed species I originally identified as the *P. bimediata* male (Johnson 1981: 180). Subsequent diagnostic recognition of dual androconial brands in *Penain-*

cisalia showed this male to be a member of the brandless *arria*-group, as also indicated by morphology (see *Penaincisalia* Remarks).

Etymology. — The name refers to paired submarginal and postmedian bands on the lower surfaces of both wings.

DISCUSSION

Penaincisalia is a high Andean monophyletic genus of cryptically marked, mostly tailless, Elfin-like butterflies known from the Central Cordillera of Colombia southward through the Cordillera Oriental of Peru and the Cerros de Bala of Bolivia. South of this area there are no records except for a species in central Patagonia. This distributional gap probably results from insufficient collecting. There is a long history of high Andean butterfly collecting from Peru northward (Brown 1941, 1942; Pallister 1956) but many areas from Bolivia southward are poorly sampled (Johnson et al. 1988, in press). Further, two immediate sister-groups of *Penaincisalia* (the *loxurina*- and *arria*- groups of *Thecla*) also occur at high altitudes in the Andes and although they are more common at sub-paramo altitudes, they are often sympatric with *Penaincisalia*. The *loxurina*- and *arria*-groups contain undescribed species that are well represented from Bolivia to montane Argentina and Chile. Two other high Andean groups of Theclinae, *Eiseliana* (Ajmat de Toledo 1978) and the *Thecla wagenknechti*/*T. heodes* assemblage (Johnson et al. in press) also occur from Colombia to central Patagonia. Collecting at altitudes above those for these latter taxa will probably yield undescribed *Penaincisalia* from central Bolivia southward.

Rather sporadic collecting of *Penaincisalia* to date indicates numerous sympatric species (see *P. pichincha* Remarks). Both the *penai* and *culminicola* subgroups of the genus have overlapping distributions from Colombia to Bolivia; each subgroup has species distributions spanning the northern range for the genus. There are also several species whose known distributions suggest substantially wider ranges. Numerous *Penaincisalia* are insular; *P. aurulenta* has only been collected in the Cordillera Blanca of Peru and *P. downeyi* is known only from Monte Tolima in the Colombian Central Cordillera.

The appearance of many sympatric *Penaincisalia* in relatively small samples suggests that many species with low density typify the genus. General character stability in *Penaincisalia* over wide ranges, and numerous sympatric insular taxa, has an important biogeographic implication. If further sampling verifies the disjunctive patterns, it would be significant in assessing the history of the group. Character data indicate that the immediate relatives of *Penaincisalia* are not Nearctic *Incisalia* or Palaearctic *Ahlbergia*, contrary to early speculations (Brown 1942, Gillham 1956). *Penaincisalia* share all major morphological attributes with other often sympatric Neotropical groups and constitute an upland lineage of these.

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APPENDIX 1

Taxa of callophyine butterflies and their relatives.

Callophryine butterflies.—Of the Eumaeini genera listed by Eliot (1973), groups included by Brown (1942), Gillham (1956), Clench (1961), Howe (1975), Johnson (1981), Johnson & Quinter (1982) and Descimon (1986) include: (1) *Ahlbergia* Bryk, (2) *Callophrys* Billberg, (3) *Cyanophrys* Clench, (4) *Incisalia* Scudder, (5) *Mitoura* Scudder, (6) *Sandia* Clench, and (7) *Xamia* Clench. Authors have widely treated the New World members (2–7) as a monophyletic group, including all or most as either subgenera of *Callophrys* (Clench 1961, dos Passos 1970, Howe 1975, Scott 1986) or separate genera (Klots 1951; dos Passos 1964; Miller & Brown 1981, 1983; Pyle 1981; Johnson & Quinter 1982; Opler & Krizek 1986). Separate genera appear preferable because Palaearctic groups are a part of the assemblage and far more diverse than indicated in the current literature (Johnson 1981, Johnson & Quinter 1982).

Sister-group.—Of the Eumaeini species groups listed by Draudt (1919), groups included by Brown (1942), Descimon (1986) and Johnson (1981) include: *Thecla culminicola*-group (herein, *Penaincisalia*), *loxurina*-group, and *arria*-group. The latter two include numerous undescribed taxa.

APPENDIX 2

Characters.—The major shared features of any structure are listed with states for: (A) *Penaincisalia* and the sister-group of “callophryine” butterflies, and (B) true “callophryine” butterflies (Appendix 1).

1. Male genitalia, cephaloventral margins of valval lobes: (A) separated by transparent sclerotin (Fig. 4[1]); (B) fully fused with opaque sclerotin (Gillham 1956; Clench 1964, 1981; Johnson 1976, 1978, 1981, 1987b; Brown 1982 [1983]).
2. Male genitalia, bilobed area of valvae: (A) opaque and ventrally convex (Fig. 4[1]); (B) transparent and flat or concave (Gillham 1956; Clench 1964, 1981; Johnson 1976, 1978, 1981, 1988b; Brown 1982 [1983]).
3. Male genitalia, caecum of aedeagus: (A) comprising at least a third of aedeagus length and often ventrally declined (Fig. 4[3]); (B) comprising a fourth or less of aedeagus length and uniplanar [or contiguously bowed] with shaft (Gillham 1956; Clench 1964, 1981; Johnson 1976, 1981; Brown 1982 [1983]).
4. Female genitalia, ductus bursae and terminal lamellae: (A) as one conjoined tubelike structure, variously constricted in the cephalic one-half to one-third, and with a prominent dorsoterminal fissure (Fig. 4[5]); (B) terminal lamellae flared distally outside plane of ductal tube, unconstricted in the cephalic one-half to one-third, and with dorsoterminal area either fused or with a transparent suture (Johnson 1976, 1978, 1981; Clench 1981; Brown 1982 [1983]).
5. Female genitalia, cervix bursae: (A) variously sclerotized into a major additional genital component (Fig. 4 [5, 7]); (B) diminutive, developed at most to a thin shield covering distal end of corpus bursae (Johnson 1976, 1978, 1981; Clench 1981; Brown 1982 [1983]).

No external wing characters consistently define the major groups, although such characters do pertain to particular genera of callophryines or certain species groups in the callophryine sister-group.

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